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ABSTRACT

This program guide was designed to assist occupational education administrators and health occupations education personnel in planning, developing, and implementing programs to prepare youth and adults for work as dental laboratory technicians. The content is presented in five sections. The first, an introduction, discusses what dental laboratory technology is, its past history and present state, and a career in dental technology. The next section, on planning the dental laboratory program, covers establishing program need, the advisory committee, staffing the program, student qualifications and selection, and survey procedures. The third section focuses on the curriculum and includes general and specific behavioral course objectives, a topical two-year course outline, clinical experience, and instructional resources. Section 4 presents some general facilities guidelines with illustrations, a list of suggested instruments and portable equipment, and a list of suggested initial supplies. The last section discusses follow-up activities, such as student placement (includes a sample employability profile form) postsecondary opportunities, and certification of the dental technician. (EM)

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HEALTH OCCUPATIONS EDUCATION

DENTAL LABORATORY TECHNOLOGY

PROGRAM DEVELOPMENT GUIDE

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The University of the State of New York/THE STATE EDUCATION DEPARTMENT
Bureau of Occupational Education Curriculum Development/Albany, New York 12234
1979

HEALTH OCCUPATIONS EDUCATION PROGRAM DEVELOPMENT GUIDE SERIES

COMMENT ON THE SERIES

The HOE Program Development Guide Series consists of a number of bulletins designed to assist local occupational education administrators and Health Occupations Education personnel in planning, developing, and implementing programs to prepare youth and adults for work in the Health Services Industry. Each bulletin focuses on a particular Health Occupations Education program area and draws upon the most current resources available.

The HOE Program Development Guide for each program area is designed to provide information relative to possible program description, clustering of occupations for training, steps in establishing the program, basic program components, organization of program components in terms of occupational clusters selected, course outline, space and equipment for teaching the program, qualifications of potential students, scheduling ideas, selected resources, and other pertinent information.

Once the need for a program in a Health Occupations Education area is identified, the first responsibility of local program planners is to appoint an advisory committee of representative experts in the field. With the advice and counsel of such a group, the HOE Program Development Guide will be a useful document to alert planners to the several important aspects of the program development.

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FOREWORD

Available data indicates that job opportunities in the construction and repair of dental and orthodontic appliances will increase in the forseeable future. On this basis, Ruth-Ellen Ostler, Chief, Bureau of Health Occupations Education, asked G. Earl Hay, Chief, Bureau of Occupational Education Curriculum Development, to plan the development of a program guide.

An initial study of existing programs was made by Ina E. Conley, Associate in Health Occupations Education, and Joseph J. Messier, Associate in Vocational Curriculum, the project director. In the fall of 1976, a grant-in-aid was made to Erie BOCES 1 to manage the development. Under the guidance and supervision of David Hill, Administrative Assistant for Curriculum, Erie BOCES 1, a manuscript was created by dental laboratory instructors Jeffrey Ortman of Erie BOCES 1 and Sol Fischler of Suffolk BOCES 3. The illustrations of the floor plan and workbench layout were prepared by Eugene F. Stalica, Professor, Hudson Valley Community College.

The manuscript was prepared for printing by Mr. Messier, then reviewed and approved by Miss Conley, Miss Ostler, and the authors for distribution by the Department as a program development guide.

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DENTAL LABORATORY TECHNICIAN

OPPORTUNITY

Modern standards of dental care and restoration have given the dental laboratory technician an important role on the dental health team. These craftsmen apply advances in restorative materials and technique to meet the growing demand for dentures, crowns, bridges and other dental and orthodontic appliances. Indeed, the dental laboratory is a work place where one combines manual skills and mechanical talents in the production of a precision, custom product -- from conception to completion -- with the foreknowledge that it must satisfy a highly personal health and cosmetic need. Although technicians rarely see or work with patients directly, theirs is a highly important support role which contributes to the well being of millions of persons of all ages.

FUNCTION:

Dental laboratory technicians make dental appliances according to dentists' instructions. This process may include the making of plaster models from impressions taken by dentists; it may also include making of metal castings for dentures, finishing and polishing of dentures, construction of metal or porcelain crowns or inlays for partially destroyed teeth, and fabrication of bridges and special appliances to correct abnormalities such as cleft palates. They work at a bench using small hand tools, special electric lathes and drills, high-heat furnaces, and other specialized equipment.

From *Health Careers Information*,
New York State Department of Health

DENTAL LABORATORY TECHNOLOGY — AN INTRODUCTION

WHAT IS DENTAL LABORATORY TECHNOLOGY?

The dental technician is a valued member of the dental health team which consists of the dentist, the dental hygienist, the dental assistant, and the dental technician. Dental technology is a complex combination of science, art, and skilled craftsmanship employed in the fabrication of dental restorations used to replace natural teeth which failed to develop or have been lost through disease or accident. Some dental technicians specialize in the fabrication of orthodontic appliances used in the realignment of natural teeth. Each dental restoration or orthodontic appliance is designed to provide both natural appearance and function, and is fabricated specifically for an individual patient according to the dentist's instructions. The relationship between the dentist and dental technician is, therefore, similar to that of the physician who writes a prescription and the pharmacist who fills it.

DENTAL TECHNOLOGY — PAST AND PRESENT

Dentistry, in some form, has been practiced for many centuries. There are records which document crude dental treatment, dating back to 3000 B.C. That progress from this point was extremely slow is evidenced by the fact that in America, commencing about 1630 A.D., the friendly town barber was also the friendly town dentist. One of the earliest known dental technicians, however, was the American patriot, Paul Revere. In addition to being one of Boston's better-known silversmiths, he also fabricated prosthetics for area dentists.

Techniques and materials used in these early days were, by today's standards, quite exotic. Wood, animal bone and teeth, and even human teeth were often employed in the fabrication of dental appliances. George Washington, the "Father of our Country," with only one natural tooth left in his mouth, painfully hissed and whistled his inaugural speech through dentures constructed of hippopotamus teeth and elephant ivory. It is believed that one of Washington's complete dentures was constructed by artist Charles Wilson Peale, famed for his portraits of the President. It is easily understood why there are very few pictures of Washington wearing a friendly smile! Further, only the rich could afford dentures like those made for Washington. The cost was considerable, and to make matters worse, the appliances had to be rebuilt or replaced at relatively short intervals due to decomposition of their materials during use.

In the mid-1700's a French pharmacist had conceived the idea of making artificial teeth from porcelain. While procelain teeth were imported into the United States about 1800, it was not until 1844 that the manufacture of this new material was perfected, and effective artificial teeth were available.

About this time a man named Charles Goodyear received a patent on his "vulcanizing" process in making rubber. With his process dawned a new era in prosthetic dentistry; a denture base material adaptable for mass use was finally available. Vulcanite — hard rubber — became the standard material for denture base fabrication and initiated the era of dental laboratories, for the necessary equipment and less-than-pleasant odors made it preferable for dentists to hire a "mechanic" to perform the technical work.

The first commercial dental laboratory in the United States was established in 1887 by William H. Stowe, a Boston dentist. Dr. Stowe was joined by Frank F. Eddy, a machinist and toolmaker. They initiated a program of on-the-job training of dental laboratory technicians, some of whom left to open their own laboratories. The idea began to spread!

Today there are approximately 6000 commercial dental laboratories in the United States, employing over 35,000 dental technicians. These laboratories range in size from one-person operations to those employing more than 200 technicians under one roof. They vary not only in size, but also in the services they provide. While many specialize in one or more limited areas, such as crown and bridge, cast partial frameworks, full dentures, or orthodontic appliances, other laboratories provide "full services" in all phases of technical dentistry.

An indication of the growth in importance of dental laboratories is the use of their services by practicing dentists. It is estimated that in 1917 about 95 percent of the laboratory work was performed in the dentists' offices, very often by the dentists themselves. A recent survey by the American Dental Association indicates that about 97 percent of the dentists in the United States used the services of commercial laboratories, although some 4400 dentists employed full-time technicians in their offices and another 1800 employed part-time technicians.

A series of national organizations have assisted the development of the dental laboratory industry. The first, organized by William G. Supplee in 1908, was the National Dental Laboratory Association — a short-lived attempt which did not receive continued support. This group was followed by the Dental Laboratories Owners Association in 1914, the American Dental Laboratory Association in 1920, and, in 1933, by a second National Dental Laboratory Association.

Currently, there are two national organizations serving the dental laboratory industry. They are the Dental Laboratory Owners Association, and the National Association of Certified Dental Laboratories, both at 3801 Mt. Vernon Avenue, Alexandria, VA 22305. There is also the Joint Commission on Accreditation of Dental Laboratories, composed of the recognized leadership of the dental laboratory industry and the dental profession. On request by a commercial laboratory owner, the Commission will evaluate the laboratory's facilities, equipment, and quality of services. If the Commission's standards are met, the laboratory is granted accreditation status.

A CAREER IN DENTAL TECHNOLOGY

Dental laboratory technicians rarely, if ever, meet the people for whom their work is intended. It is their responsibility to make and repair such prosthetics as dentures, crowns, bridges, inlays, and orthodontic appliances under the direction of, or conforming to the prescription of, a licensed dentist. The work requires painstaking craftmanship with a variety of delicate tools and materials.

Generally, the technician works a 40-hour week and receives such usual fringe benefits as paid vacations and legal holidays, hospitalization insurance, and sick leave. Some laboratories also provide a bonus plan. Salaries vary, of course. While government statistics *for 1974* list $4,700 as the average salary of technician-trainees, the geographic location of the laboratory and the individual ability of the new employee significantly alter the figure, as does the general increase in wages since then. Currently, the fully qualified technician may earn between $10,000 and $30,000 per year. As a rule, technicians who specialize in ceramics receive the highest salaries. Graduates of

ADA-approved dental laboratory technology programs, without experience, usually receive a starting salary $2,500 to $3,000 higher than the trainee who has had no preparation.

A high school diploma *should* be considered the minimum educational requirement for entry into a career in the dental laboratory field. To date, the usual way of learning the craft has been through on-the-job training. Although the learner can progress as rapidly as personal capability permits, the training usually lasts a minimum of four years. A far more effective way to prepare for a career as a laboratory technician is through enrollment in an approved school program. There are approximately 40 ADA-accredited 2-year programs in colleges across the country, which award associate degrees in dental laboratory technology. In addition public secondary school occupational education programs in dental laboratory technology are increasing in number each year. Most employers and experienced technicians agree, however, that the graduate of either the secondary or postsecondary program will need three years of practical experience to become recognized as a well-qualified technician.

After five years of experience, or combined training and experience, the dental laboratory technician may seek certification. Certification is awarded by the National Board for Certification, a trust established by the National Association of Certified Dental Laboratories. On passing a written examination in one or more specialty areas and satisfactorily completing a practical project, the applicant is awarded the title of *Certified Dental Technician* (CDT) in the specialties examined. It is significant that certification — although voluntary — is becoming increasingly important to the technician as a measure of personal competence.

Prospective technicians may find employment not only in commercial dental laboratories and offices of private-practice dentists, but also in hospitals, clinics, and educational and research institutions. Companies that manufacture dental materials and equipment frequently employ dental technicians as technical or sales representatives. Some technicians, who have sufficient experience and good business sense, go into business for themselves. It is a significant fact that almost all dental laboratories today, are owned and operated by dental technicians.

Depending on the size and type of laboratory, the technician may work in only one area of fabrication, in a few, or in all kinds of laboratory work. The technician who works for a private-practice dentist or in a small commercial laboratory, will most likely be an "all-around" technician, competent in all procedures. In the large laboratory, or the specialty lab, technicians may be specialists in making crowns and bridges only, or in arranging artificial teeth on dental appliances, or in processing plastic materials, or in working with dental ceramics, or in making gold or other metal alloy castings.

The employment opportunities for qualified dental technicians are expected to be excellent into the mid-1980's. Among the factors affecting the predicted growth in demand are an increasing public awareness of dental health care, increased life expectancy and the attendant increase in the number of persons needing prosthetics, the expansion of dental prepayment plans, and government programs of Medicaid and Medicare. Moreover, the number of dentists is not expected to increase in proportion to the increased demand for care. In order to devote more time to chairside treatment of patients, dentists will send more of their laboratory work to commercial laboratories or hire dental laboratory technicians to work directly for them in either single or group practice.

PLANNING THE DENTAL LABORATORY PROGRAM

ESTABLISHING PROGRAM NEED

Although there is ample evidence that employment opportunities for dental laboratory technicians are increasing nationwide, *the predominant factor in determining whether to include a dental laboratory technology program in the specific school's curricula is the employment potential of that school's area.* The following guidelines should be helpful in determining the feasibility of initiating a program —

1. Commercial dental laboratories which employ large numbers of technicians tend to be located in, or near, metropolitan areas. This suggests that the most logical schools to consider offering a program of dental laboratory technology are large city school districts and BOCES in, or near, large urban areas. In order to obtain a quick idea of the potential need for a program, the following procedures are suggested.
   - Review the "help wanted ads" in local and nearby newspapers, over a period of two or three months.
   - Contact area offices of the State Employment Service for information and advice.
   - In metropolitan areas, consult the Chamber of Commerce directory for listings of professional organizations. The American Dental Association, The Dental Laboratory Owners

Association, and The National Association of Certified Dental Laboratories should provide an indication of the size and growth rate of the industry in the area.

- If dental schools are nearby, they can furnish data on the local laboratories' need for trained technicians.
- Local government social service agencies should be consulted regarding their present and future needs for dental technology services.

2. If preliminary contacts with these sources suggest a need for a program of dental laboratory technology, a more detailed survey should be made to verify the need and to determine the probability of long-term employment of such a program's graduates. A recommended procedure for conducting a survey is located at the end of this section of the Guide. Since this procedure can be used in conducting any type of survey, some specific suggestions for the dental laboratory technology program survey are offered.

   - The type and length of survey, and the population surveyed, will be determined to a large degree by the expected outcomes of the survey. If doubts remain as to the feasibility of initiating the program, the design should be a simple, one-page instrument whose only objective is to determine employment potential. If, however, the preliminary investigation indicated a strong need for a program development, a more detailed survey should be conducted which provides not only employment data, but also information regarding curriculum content.

- If a decision is made to initiate a dental laboratory technology program, an advisory committee must be established to provide advice regarding curriculum, facility design, and teacher recruitment. Selection of members of an *ad hoc* survey committee may be made with intention to request service on the advisory committee. Representation from the dental laboratory industry's professional organizations is of considerable importance. Not only will the organization's name associated with the survey produce better response, in some instances the organization may volunteer to conduct the survey or underwrite the cost, when made aware of the need and involved in the planning.
- It is obvious that commercial dental laboratories, hospitals which have dental clinics and laboratories, and dental schools should be surveyed. Since many dentists also employ full-time or part-time technicians, they should also be surveyed. In addition to employment data, the dentists would be able to provide information regarding the types and quality of service presently provided by commercial laboratories — information which should be helpful in determining curriculum content and emphases.

The method of collecting data will, of course, depend upon a number of factors, including the size of the sample to be surveyed, survey time constraints, and availability of staff. An important factor is that personal contact results in a higher percentage of returns, usually containing a better quality of data, than does the mailed survey. If, however, the mailed survey

must be used it is important to *keep the instrument brief.* If well designed, one or two pages can provide sufficient information. Manual tabulation vis-a-vis computer tabulation of the data is also dependent upon sample size, availability of staff, and funding. However, the decision on how the data will be processed should be made before the survey is conducted, to avoid confusion and delays later.

THE ADVISORY COMMITTEE

Once the need for a dental laboratory technology program has been established, more detailed planning should begin. Although the material in this Guide will be helpful, it is necessary that input from a local advisory committee be sought. As a minimum, committee membership should include dental laboratory owners, qualified dental technicians, and practicing dentists, in order to assure input from employers and their customers. In addition, inclusion of representatives of such community organizations as the Chamber of Commerce is of value from a public relations point of view. After a few years, the addition of a graduate is advisable.

Specific terms of office should be established to provide periodic "new blood." To provide continuity a staggered system of terms should be devised.

The responsibilities of the advisory committee should be defined clearly from the beginning. The members must understand that their recommendations on curriculum, facilities, staff and student recruitment, and other matters are critical to the success of the program, but that the ultimate responsibility and authority for *decisions* rests with the educational institution.

The advisory committee should meet at regular and frequent intervals as the program is developed. After the program is initiated less frequent meetings will be necessary until, when the program is firmly established, one regular meeting each term and perhaps one at midterm should suffice to ensure that the curriculum, facilities, and policies reflect current trends in the dental laboratory industry. The Director of Occupational Education, Curriculum Coordinator, and guidance personnel should join the faculty and coordinator of the dental laboratory technology program in meeting with the advisory committee, that they may receive its advice and assistance directly. A record of deliberations at all committee meetings should be maintained.

STAFFING THE PROGRAM

An applicant for appointment to the Dental Laboratory Technology faculty must possess three occupational qualifications: knowledge of current concepts of dental laboratory technology, recognized competence in pertinent dental laboratory procedures and techniques, and sufficient practical experience as a technician. Certified Dental Technician (CDT) status, while not required, is always a good indication of competence and professional motivation.

Candidates for faculty positions should also have teaching experience, or course credit in education which is applicable toward New York State teaching certification. Individuals lacking a teaching background should be encouraged to begin the teacher-education program, and be provided opportunity to do so by the hiring institution.

Teacher/student ratios in dental laboratory technology programs should be calculated to ensure effective instruction and evaluation. Since a major portion of the program consists of intricate projects

which require a high degree of accuracy, it is extremely important that each student receives a considerable amount of individual attention. In addition, the preponderance of dental laboratory projects require each student to work alone — pairs or groups of students, in which an advanced student helps one or more novices, can rarely be utilized. The resulting constant demands on the teacher's time is a factor which must be kept in mind when determining the program's teacher/student ratio.

The feasibility of hiring the teacher at least six months prior to implementing the course should be considered. This would ensure time for the teacher to provide input to, and work with, the advisory committee and school administration in developing the curriculum, planning facilities, ordering supplies, selecting students, and resolving the problems which may ensue before implementation of the instructional program.

STUDENT QUALIFICATIONS AND SELECTION

There is a shortage of dental technicians! According to American Dental Association figures, less than twenty percent of the annual need is being met. This does not, however, indicate that *anyone* can achieve success as a dental technician. The development of a skilled dental technician is a quite lengthy, often tedious, process in which certain personal abilities and characteristics are indispensable.

A high degree of finger dexterity is required, since the technician must manipulate a variety of delicate materials and tools. The prospective student should have the desire — or at least the ability — to work alone and independently, often for extended periods of time. Patience is a necessary attribute; impatience can hinder even the otherwise successful technician. A perfectionist quality or tendency can

also be a characteristic of value in the laboratory. Interest in fine detail is a most useful attribute of the dental laboratory technician. Normal vision and acute color perception will certainly aid the student to achieve acceptable results in the more demanding areas of dental technology. Since dental laboratory technicians rarely contact the people they serve, but deal only with dentists and other technicians, the physical characteristics which normally are considered to be liabilities in public contact jobs can usually be discounted. The technician's work is not physically strenuous, so many kinds of muscle handicaps would prove no barrier to employment. Some degree of mobility is required. Although there may be pressure to meet time schedules, the dental laboratory is usually a relatively calm place in which to work.

Academically, it is desirable for prospective students to have knowledge of such basic sciences as biology, chemistry, and physics. *This is not a requirement!* There are many fine technicians who were never exposed to courses in these sciences. This background is, however, helpful in the theory portions of the program. Students who have experienced success in such studies as art and a variety of industrial arts shop courses, and have positive feelings for their challenges, should be viable candidates.

The determination of ways to encourage young people to pursue a career in dental technology, whether at the secondary level or post-secondary, should begin with the education of school personnel to the dental auxiliaries. Most certainly the guidance staff and students' advisors should be familiar with the dental health team. Counselors must understand not only the responsibilities of each auxiliary, but also be acutely aware of the major personal attributes which can indicate either

success or probable difficulties for prospective students of dental laboratory technology. Pre-evaluation would be most helpful to both prospective students and the teachers, if the testing instruments were valid and reliable. A dexterity evaluation would certainly help prospective students discover whether they possessed a necessary level of manual dexterity — *before* students' and teacher's time, efforts, and hopes were expended. Likewise, a test for introversion-extroversion could identify the strong extrovert and ensure understanding of the nature of this work, thus allowing a timely move to an area more fitting a gregarious personality.

Finally, it should be emphasized that while the prospective dental laboratory technicians will certainly benefit from a program of formal education, they should be fully aware that a period of apprenticeship is to be served as a necessary part of their development into acknowledged, skilled dental laboratory technicians.

SURVEY PROCEDURES

Responsibility	Activity
Administrator	1. Outlines the expected outcomes of the survey and the tasks to be accomplished 2. Develops a timetable for completing the survey 3. Appoints a committee to assist with the survey
Survey Advisory Committee	4. Selects the sample to be surveyed 5. Determines the method of data collection (personal interview, mail, telephone, other) 6. Develops the instrument 7. Develops the cover letter or covering directions
Administrator	8. Meets with data processing people to discuss coding the instrument 9. Pre-tests the instrument
Survey Advisory Committee	10. Revises the instrument, if needed
Administrator	11. Meets with data processing people to actually code the instrument
Survey Staff	12. Conducts the survey A. Personal Interview (1) Develops visitation schedule (2) Assembles interviewer's kit (3) Trains interviewers B. Mail Surveys (1) Develops a schedule for sending surveys and reminder cards (2) Mails first cover letter and instrument (3) After one week, sends thank you and reminder cards (4) After two weeks, sends second cover letter with instrument (5) Places telephone calls to non-respondents (6) Visits non-respondents

SURVEY PROCEDURES

Responsibility	Activity
	C. Telephone (1) Develops calling schedule (2) Trains callers
Data Processing People	13. Tabulate the data
Administrator	14. Analyzes the data
Survey Advisory Committee	15. Interprets the data 16. Prepares a report of the findings with recommendations
Administrator	17. Disseminates findings

COURSE OBJECTIVES

The successful graduate of the program will be prepared for employment as a dental laboratory technician in a dental office or dental laboratory. The course is designed to introduce and develop knowledge and skills to the point where the students will have a complete understanding of basic dental prosthetic construction.

General Objective:

The student will demonstrate the technical knowledge and skills, the work habits and cleanliness, and the safety and health procedures necessary to secure employment as a dental laboratory technician, upon graduation.

Specific Objectives:

The student will be able to classify and analyze the various types of edentulous situations and relate them to the methods of constructing dental restorations.

The student will prepare practical examples of the most common types of dental restorations, as demonstrations of the attainment of technical knowledge and skills.

The student will continually demonstrate the work attitudes and personality characteristics necessary for success as a dental laboratory technician.

COURSE OUTLINE

The *recommended* course of study in Dental Laboratory Technology requires two academic years of study, each year to consist of a minimum of 160 instructional days of 2½ hours duration. Successful completion of this program will provide the student with entry-level skills and knowledges in the complete range of dental laboratory procedures, and a Group II sequence of four credits as set forth in *The Secondary School Curriculum of New York State: A Handbook for Administrators*.

Entry-level placement may also be secured on completion of a one-year program which provides minimal skills development, and two credits toward graduation as a Group III elective. Such a program can *not* be considered to fulfill the requirement for a Group II sequence. The one-year course outline should differ from the following two-year outline only in the elimination of instruction in the ceramics area.

I. ORAL ANATOMY

- Mandible
  - Inner surface
  - Outer surface
  - Ramus
  - Condyle
  - Coronoid process
  - Alveolar ridge
- Maxilla
  - Outer surface
  - Palatal surface
  - Alveolar ridge
- Landmarks visible in the mouth
  - Common to both mandible and maxilla
  - Common to mandible

- Dental foramen
  - Common to maxilla
- Tooth arrangement
  - Anterior - upper, lower
  - Posterior - upper, lower
  - Number system
- Surfaces of teeth
  - Anterior
  - Posterior
- Surrounding and supportive structures
  - Periodontium
- Tissues of teeth (Histology)
  - Crown
  - Cervical line
  - Root

II. DENTURE BORDER ANATOMY

- Upper
  - Labial flange
  - Buccal flange
  - Posterior border
- Lower
  - Labial flange
  - Buccal flange
  - Anterior lingual flange
  - Posterior lingual flange
  - Posterior borders (heels)

III. COMPLETE DENTURES

- Preliminary models
  - Pouring upper and lower edentulous models from rubber molds - identifying anatomy
  - Pouring upper and lower edentulous models from alginate impressions - inversion

- Custom impression trays
  - Design custom tray
  - Mixing tray resin for custom tray
  - Spacer
  - Heating and forming shellac base tray
  - Trimming
- Master casts
  - Pour upper and lower models
  - Identify landmarks
  - Trimming
- Trial baseplate
  - Design
  - Heating and forming shellac baseplate
  - Stabilization
  - Trimming
- Occlusion rims
  - Design
  - Heating and forming baseplate wax for complete occlusion rim
  - Trimming and forming to proper dimensions
- Articulation
  - Types of articulators
  - Postioning casts
  - Maintenance of jaw records
- Setting up artificial teeth
  - Setting upper anteriors for esthetics, contour, function
  - Setting lower anteriors for esthetics, contour, function
  - Setting upper posteriors for function
  - Setting lower posteriors for function (occlusion)
- Waxing (festooning)
  - Heating and carving baseplate wax
  - Natural contour
  - Function
  - Esthetics
  - Hygiene

- Investing
  - Separation of casts and wax-up from articulator
  - Preparation of flasks for investment
  - Mixing plaster for one-half flasking
  - Mixing stone for matrix
  - Capping
- Boilout
  - Removal of wax and trial base from investment
  - Cleaning of investment
  - Post dam seal development
- Packing
  - Preparing of investment for packing
  - Mixing of denture base resin (characterized)
  - Packing
  - Handling of press
- Curing
  - Denture base resin curing requirements
- Recovery
  - Removal of investment from flask
  - Separation of investment from dentures
  - Detail and clean-up
- Finishing
  - Trimming
  - Pumicing
  - Polishing
- Delivery

IV. DENTURE REPAIR

- Tooth repair
  - Control of tooth positions
  - Preparation of denture for repair
  - Seating of tooth in proper position
  - Self-curing technique - pressure curing unit
  - Finish and polish

- Fracture
  - Broken denture splinted
  - Pouring of cast
  - Fracture area prepared
  - Investing of denture or quick cure technique
  - Finish and polish
- Reline
  - Full lower reline - beaded and boxes
  - Cast poured and occlusal index taken
  - Control of vertical dimension
  - Preparation of denture
  - Waxing of denture
  - Investing of denture, boil out, pack and process
  - Finish and polish
- Rebase - porcelain teeth
  - Pouring of casts
  - Control of vertical dimension
  - Preparation of teeth
  - Investing
  - Removal of denture base resin
  - Packing, curing, recovery, finishing

V. CAST PARTIAL DENTURES

- Preliminary casts
  - Pouring partially dentulous casts
  - Identifying landmarks
  - Trimming
- Articulation
  - Maintenance of jaw records
- Basic survey and design
  - Use of surveyor
  - Design

- Custom tray
  - Design
  - Trimming
  - Perforation
- Master casts
  - Pouring of impressions
  - Identify landmarks
  - Trimming
  - Re-surveying
  - Design transfer
  - Blocking out undesirable undercuts
  - Relief
- Refractory cast
  - Flask preparation
  - Hydrocolloid manipulation
  - Pouring duplication with investment
  - Trimming
  - Cutting sprue hole
- Pattern construction
  - Use of preformed plastic patterns
  - Hand waxing
  - Saddle design
  - Clasp design and selection
  - Minor connectors
  - Major connectors
- Spruing - upper
  - Attaching auxiliary sprues
  - Attaching cast on sprue base (former)
- Spruing - lower
  - Developing auxiliary sprues
  - Attaching main sprue
  - Preparing pattern for investment

- Investing
  - Preparation of investment ring
  - Cast preparation
  - Handling of investment
- Burnout
  - Oven preparation
  - Temperature
  - Time
- Casting
  - Preparing casting machine
  - Adjusting for proper flame (gold frame)
  - Control of thermotrol casting machine
  - Metal control
- Finishing
  - Sprue removal
  - Use of high-speed grinder
  - Pickling
  - Polishing techniques
- Setting teeth
- Waxing (festooning)
- Investing
  - Flask preparation
  - Frame-up
  - Frame-down
- Packing
  - Manipulation of denture base resin
  - Maintenance of frame position
- Curing
  - Denture base resin curing requirements
- Recovery
  - Removal of investment from flask
  - Separation of investment from dentures
  - Detail and clean-up

- Finishing
  - Trimming
  - Pumicing
  - Polishing
- Delivery

VI. PARTIAL DENTURES (Wrought)

- Nesbitt (unilateral) 2 wrought Bonwill clasps
  - Pouring of partial cast
  - Articulating of casts
  - Bending of wire clasps
  - Adding rest and tail piece
  - Invest for soldering
  - Solder and finish clasps
  - Set-up of teeth
  - Wax for finish
  - Invest, boil out, pack and finish partial
- Bilateral upper (2 posterior saddles) Bonwill clasps
  - Pouring of cast and bit block
  - Articulation
  - Set up teeth for trial insertion
  - Bend wire - add rests and tail piece
  - Set clasps on abutments
  - Reposition set-up
  - Wax for finish
  - Invest, pack and finish
- Bilateral lower (2 posterior saddles) 2 Bonwill clasps
  - Pour casts and make bite blocks
  - Articulate
  - Set up posterior teeth
  - Wax for trial insertion
  - Bending of wire clasps - add rest and tail piece
  - Reset teeth
  - Wax for finish
  - Invest, pack and finish

VII. DENTAL PHYSIOLOGY FORMS (Carving)

- Tooth anatomy
  - Carve geometric form of upper central
  - Reduce to anatomical structure
  - Carve geometric form of upper lateral
  - Reduce lateral to anatomical form
  - Carve full quadrant of upper teeth anterior and posterior
  - Carve full quadrant of lower teeth anterior and posterior

VIII. INLAYS — CROWN AND BRIDGE

- Introduction to copper plating
  - Equipment and materials needed
  - Explain copper plating machine
  - Plating of die and acrylic stem and pin
- Inlays
  - Copper plated die
  - Pour die and place in impression
  - Pouring of mechanical articulation
  - Wax up inlay
  - Sprue and invest (non-hygroscopic)
  - Burn out and cast inlay
  - Correct finishing procedure
- Cast crowns
  - Copper plating of die
  - Proper trimming of margins
  - Articulate
  - Wax up of crown - wrap and dip method
  - Investing - using debubblizer
  - Burn out and cast
  - The termatrol casting machine
  - Finish and polish crown
- Cantilever bridge (steels)
  - Rubber base impressions
  - Pouring the stone die and pin stem
  - Completing full cast

- Articulate
- Cutting out stone die and trim margins
- Wax up of 3/4 crown
- The ground in backing and facing
- Spruing and investing
- Burn out, cast and finish

• Veneer crown bridge #1
- Copper plating of abutments (2nd bicuspid - 1st molar)
- Pouring of dies and articulate
- Wax up veneers and pontics
- Invest abutments and pontic (not one piece)
- Burn out, cast and finish units
- Solder and finish abutments

• Veneer bridge #1
- Dowel pin technique for rubber base
- Complete working model and articulate
- Trimming of dies
- Wax up abutments - one piece
- Invest, cast and finish structure

• Veneer Bridge #3
- Rubber base technique
- Set up for dowel pins and pour in castone
- Articulate
- Wax up abutments and pontics (occlusals) one piece
- Invest hygroscopic
- Cast and finish structure

• Veneering of gold structures
- Wax up of bridges using correct contour
- Opaquing in flask
- Opaquing before wax up
- Proper investing of bridges in bridge flask
- Packing of acrylic
- One pack method

- Two pack method
- Line of demarcation
- Correct shading
- Finishing of bridges - #1, 2, and 3

IX. CERAMICS — PORCELAIN FUSED TO GOLD

- The porcelain veneer
  - Copper plating of upper central
  - Seating of die in appropriate impression
  - Pouring of model and articulation
  - Waxing up of veneer
  - Investing in high heat investment
  - Burn out and casting of veneer crown
  - Cleansing of casting
  - Finish and polishing ceramic metal
- Three unit ceramico bridge (posterior bridge)
  - Rubber base impression
  - Stone dies and pin extension
  - Complete full model and articulate
  - Wax up three unit ceramico bridge (one piece)
  - Investing of bridge in high head investment
  - Burn out, cast and finish bridge
- The anterior bridge (ceramico casting)
  - Rubber base impression
  - Epoxy dies and pin extention
  - Pour cast and articulate
  - Wax up full coverage anterior bridge (one joint open)
  - Burn out and cast bridge
  - Solder and finish bridge
- Degassing of metal
  - Proper handling of the procelain furnace
  - Method of degassing and proper casting procedures
  - Reasons for degassing

- Applying the opaque
  - Consistency
  - Application
  - Thickness
  - Baking
  - Corrections
  - Modifiers
  - Opaque veneer, posterior bridge and anterior bridge
- Building up for first bake
  - Vibration
  - Capillary flow
  - Pressure
  - Brushing
  - Consistency
  - Build up body and incisal for veneer crown
  - Fire and finish
- Applying the body porcelain
  - The buildup and shaping
  - Consistency
  - The vacuum pump
  - Technique for vacuumed porcelain
  - Build up anterior bridge, body and incisal
  - Firing anterior bridge
  - Build up posterior bridge
  - Fire and glaze
- Staining
  - Firing range
  - Natural and artificial glaze
  - Glazing mediums
  - Diluting agents
  - Staining of anterior bridge
  - Staining of posterior bridge

CLINICAL EXPERIENCE

No matter how faithfully the school's facility duplicates the modern dental laboratory — and it should be a copy — the student cannot experience the real world of the dental technician without spending time in that real world as an employee or trainee. A well developed Dental Laboratory Technology program should include a supervised clinical or cooperative work experience as part of the instructional plan. Dental school laboratories, hospital dental laboratories, commercial dental laboratories, and dental offices should be approached toward cooperating in providing this practical experience to the student of Dental Laboratory Technology.

Regardless of the approach used to provide occupational experience, certain guidelines should be observed.

As a first consideration, prospective cooperating organizations should be carefully scrutinized to determine the extent and quality of physical facilities, supervision provided, work environment and attention to safety, and the services provided. As a general rule, a full-service laboratory will be able to provide a more complete learning experience. There may be times, however, when a combination of speciality laboratories can be sequenced to provide a well-rounded experience.

A written agreement, signed by officials of the school and the cooperating organization, must be executed. It is advisable to have the document approved, if not constructed, by the school legal counsel. The agreement should state the number of students to be involved, the days and hours of involvement, the extent of organization employee involvement and attendant cost to the school, the organization's role in evaluating student progress, and procedures for terminating participation of specific students — and of the agreement itself.

It is extremely important that the school personnel and the cooperating organization personnel reach agreement on the training functions to be performed. A training plan which outlines the objectives of the program, and the specific training expectations for each student is helpful in clarifying the matter.

Periodic visits to cooperating laboratories are necessary for efficient program operation. They are valuable in the correlation of related classroom instruction to the work experience, in comparing the student's accomplishment to the training plan content, and in evaluating the rate and quality of student progress.

Problems sometimes occur in a clinical experience program. Young people being initiated into the work world do not always conform to acceptable standards of performance or behavior. Employers, on the other hand, are sometimes prone to be more concerned with production quotas than with the personal development of the young worker. Most of the resulting problems can be eliminated, or at least minimized, by tactful visits to the cooperating organization. Arrangements should be made for both the teacher and the cooperative education coordinator to make visits. In some cases they will confer with the employer or supervisor only; in other cases the student will also be involved.

At the conclusion of the visit, a supervisory visit report should be completed to assure follow-up of items discussed during the visit. The accumulated supervisory visit reports are very valuable in developing a year-end evaluation of the occupational experience program.

Work records should be kept of each student in the occupational experience program. Included should be attendance, supervisor's evaluation of the student's work attitudes and habits, and a brief

description of the jobs, operations, and processes the student has performed. The accumulated work records forms the actual pattern of the student's work progress.

INSTRUCTIONAL RESOURCES

Related instruction becomes more purposeful, more interesting, more readily absorbed, and better retained when audiovisual aids to instruction are carefully employed. Typical aids to classroom instruction are films, film strips, slides, opaque projections, study guides, workbooks, monographs, wall charts, manufacturers information, laboratory manuals, industrial bulletins, trade journals, models and mock-ups, cutaway charts, samples, and commercial exhibits.

The use of audiovisual aids must be governed by the same fundamental principles of education that apply to any group instruction. The information must be real and meaningful to the students, and should proceed in definite, orderly steps. Aids must not be used as expedients, to carry the unprepared teacher through class periods when more appropriate instruction should have been provided.

The community usually contains people capable of lively delivery of pertinent information to the students. They should not be neglected. Experienced speakers from the dental industry and related areas can be utilized. When such resource persons are secured to talk with students in related information classes, it is advisable to help them select and prepare materials which are best suited to those students' needs. The students should be briefed regarding the discussion topic, and encouraged to be ready with pertinent questions to stimulate discussion.

Texts and references are, of course, the basic instructional tools. Their value lies in their ready availability to the student, for progress at that student's pace, or review as that student needs at the moment.

The following list is an example of the resources which could be helpful in a Dental Laboratory Technology program of instruction. While some titles are still "standards," new materials are continuously being developed. The teacher should keep abreast of new developments by maintaining contacts in the dental technology profession, and through subscription to appropriate professional journals.

Selected References

Dentsply International, Inc. *Arrangement and articulation of Trubyte teeth.* York, PA. The Corporation. 1976.

Hudis, Morris. *Dental laboratory prosthodontics.* Philadelphia. W.B. Saunders Company. 1977.

J.F. Jelenko and Company. *Crown and bridge construction;* 6th ed. New Rochelle, NY. The Company. 1963

_____ *Partial dentures.* New Rochelle, NY. The Company. 1966

_____ *Principles of surveying.* New Rochelle, NY. The Company. 1966.

_____ *Technic manual.* Chicago. L.G. Division. 1972.

Johnson, John F. et al. *Modern practice in crown and bridge prosthodontics;* 3d ed. Philadelphia. W.B. Saunders Company. 1971.

J.M. Ney Company. *Crown and bridge manual.* Hardford, CT. The Company.

*Martinelli, Nickolas. *Dental laboratory technology.* St. Louis. C.V. Mosby Company. 1975.

Murray, Henry V. & Sluder, Troy B. *Fixed restorative techniques.* (The Dental Laboratory Technical Manual Series) Chapel Hill, NC. University of North Carolina Press. 1972.

Phillips, Ralph W. *Skinner's science of dental materials;* 7th ed. Philadelphia. W.B. Saunders Company. 1973.

Sowter, John B. *Dental laboratory technology — prosthodentic techniques.* Chapel Hill. University of North Carolina. 1968.

United States Air Force. *Dental laboratory technician's manual.* Washington. U.S. Government Printing Office. 1959.

*United States Navy, Bureau of Naval Personnel. *Handbook for dental prosthetic technicians.* Washington. U.S. Government Printing Office. 1965.

Wheeler, Russell C. *Atlas of tooth forms;* 4th ed. Philadelphia. W.B. Saunders Company. 1969.

_____ *Dental anatomy, physiology, and occlusion.* Philadelphia. W.B. Saunders Company. 1974.

**Suggested as student text.*

Periodicals

The bulletin. New Jersey Association of Certified Dental Laboratories. 42 Fairway Drive, West Orange, NJ 07052. Monthly.

Cal. Coe Laboratories, Inc. 3737 West 127th Street, Chicago, IL 60658. Monthly.

C.D.T. digest. National Board for Certification. National Association of Certified Dental Laboratories, Inc. 3801 Mt. Vernon Avenue, Alexandria, VA 22305. Quarterly.

Crucible. LG Division; J.F. Jelenko & Company. 809 West Washington Boulevard, Chicago, IL 60607. Bi-monthly.

Dental industry news. Dental Survey Publications, Inc. 4015 West 65th Street, Minneapolis, MN 55435. Monthly.

Dental lab age. Esco Publishing Co. 10854 Morrison, Suite 3, North Hollywood, CA 91601. Monthly.

Dental Laboratory news. New York State Association of Certified Dental Laboratories. 220 West 42d Street, New York, NY 10036. Bi-monthly.

Dental Laboratory review. Dental Survey Publications. 4015 West 65th Street, Minneapolis, MN 55435. Monthly

NADL journal. National Association of Certified Dental Laboratories. 3801 Mt. Vernon Avenue, Alexandria, VA 22305. Monthly, except July.

Films

These suggested 16mm films may be rented from the Bureau of Audiovisual Service, American Dental Association, 211 East Chicago Avenue, Chicago, IL 60611. Television use is not authorized unless so stated.

An advanced reconstruction crown and bridge technique for the general practitioner; No. DT 282. Color. Sound. 36 Minutes. 1964. $3.50. Prepared by Victor W. Mintz, D.D.S. Full month reconstruction by a simple and accurate technique. The film demonstrates tooth preparation, fabrication of a tray, complete retraction of tissue, and the taking of a rubber-base impression for a full arch and nine abutment teeth. Also the laboratory technique of a porcelain-bonded-to-gold restoration, and the balancing of the bite and occlusion. The bridge is inserted and checked for phonetics and esthetics.

Complete denture articulation; No. DT 167. Color. Sound. 25 minutes. 1956. $4.50.
Shows in detail the construction of a complete denture from wax-up to try-in. The wax-up of the teeth is given in detail. Explanation of working bite, balancing bite, protrusive bite, and the details of articulation and relationships.

Duplication of the natural dentition for the immediate denture patient: part I; No. DT 454. Color. Sound. 15 minutes. 1971. $1.50.
Prepared by Robert L. Pearce, D.D.S. The technical procedures for fabricating acrylic denture teeth and duplicating the mold, shade position, and arrangement of the natural teeth for the immediate denture patient. The film opens with an introduction by Dr. Dayton D. Krajicek who discusses esthetics with Drs. Irving R. Hardy and Robert L. Pearce. Preoperative views of the patient: Covers procedures up to the flasking technique.

Duplication of the natural dentition for the immediate denture patient: part II; No. DT 455. Color. Sound. 15 minutes. 1971. $1.50.
Prepared by Robert L. Pearce, D.D.S. The technical procedures for fabricating acrylic denture teeth and duplicating the mold, shade position, and arrangement of the natural teeth for the immediate denture patient. Demonstrates the flasking technique in detail, and continues the procedures to the end result, with postoperative-views of the patient.

Fluid resin technique for processing complete dentures; No. DT 418. Color. Sound. 20 minutes. 1970. $1.50.
Prepared by Brien R. Lang D.D.S.
Shows the technique of processing dentures using fluid resin in a hydrocolloid mold. The flasking procedure — which uses no gypsum products — spring, pouring the resin, and recovery of the finished denture are demonstrated.

Available from Universal-Lactona Company, 201 Tabor Road, Morris Plains, NJ 07950.

Esthetics. Color. Sound. 25 minutes. 1975. Prepared by Medcom Learning Systems, Universal-Lactrona Company. Illustrates an excellent example of both the dentist's and the technician's roles and concerns in generating natural appearance of the patient's dental restoration.

Information

General:

Council of Dental Education
American Dental Association
211 East Chicago Avenue
Chicago, IL 60611

Certification:

National Association of Certified Dental Laboratories, Inc.
3801 Mt. Vernon Avenue
Alexandria, VA 22305

Apprenticeship:

The Dental Laboratory Conference
1918 Pine Street
Philadelphia, PA 19103

FACILITIES, EQUIPMENT, SUPPLIES

FACILITIES GUIDELINES

The illustrations which follow provide an overview of the requirements for a basic dental laboratory teaching facility. Explanatory notes specific to that instructional area are included with each illustration. There are, however, some general guidelines which should be considered in developing the facility.

1. Work flow is extremely important in the dental laboratory, in order to assure the efficient, safe operation of the lab. The complete and partial denture area, the casting bench, and the plastic bench areas used for crown and bridge work, should be designed to provide for this work flow.
2. Visual control of the laboratory area is important so that proper supervision of the students can be provided. Placing the student work stations in the middle of the room, and the specialized work stations around the walls, provides for good visual control. The wall units are stand-up units since much of the work done at these areas requires that the technician be mobile.
3. Work in the dental laboratory requires the use of chemicals, abrasives, and high temperatures. Therefore, all work surfaces and floors should be resistant to these chemicals and heavy

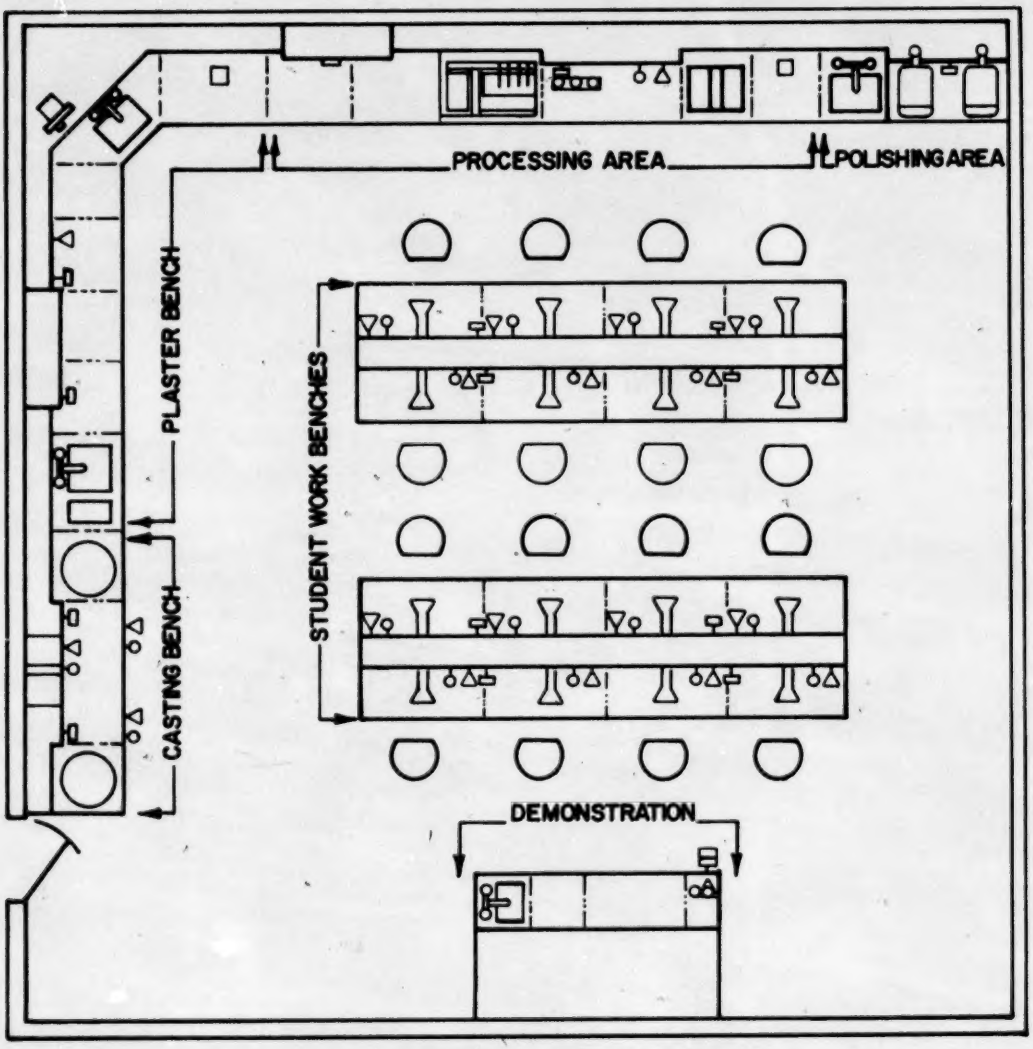
abrasion, and must be fireproof. All cabinetry should be steel rather than wood.

4. Some processes in dental laboratory work generate fumes which are not only offensive but a safety hazard. It is imperative, therefore, that an adequate exhaust system be installed.
5. Many of the materials used in the dental laboratory react unpredictably when exposed to extremes of temperature. The dental laboratory should, therefore, be climate controlled so that temperatures do not exceed 75 degrees Fahrenheit. In order to prevent spoilage of supplies, storage areas should be similarly temperature controlled.
6. The Dental Laboratory Technology facility should be equipped with a master shutoff valve for both gas and electricity. This is an absolutely necessary safety precaution.

A ceramics area is not included in the following illustrations. If ceramics work is part of the curriculum an isolated area adjoining the main dental laboratory facility should be provided, to avoid contamination of materials.

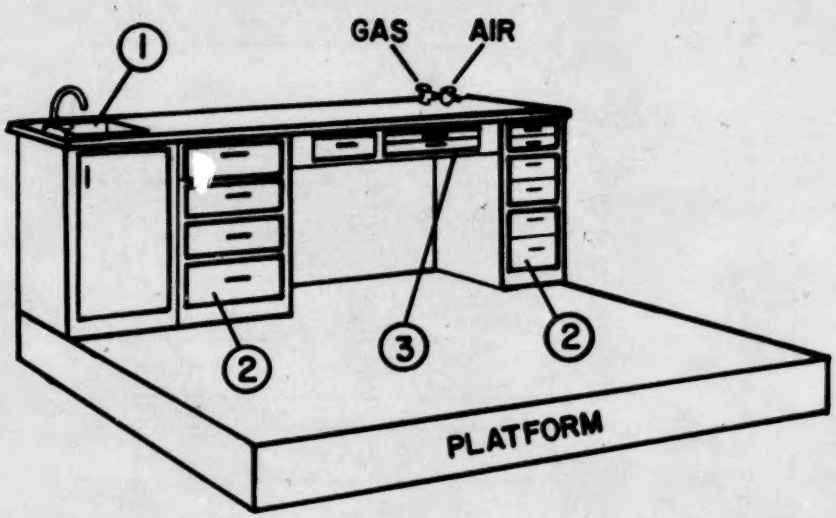
The Bureau of Health Occupations Education is developing a set of detailed facilities planning guides for health occupations programs. The guides will be distributed to the schools when available. Information and assistance in planning a Dental Laboratory Technology facility may be obtained from the Bureau.

SAMPLE PLAN FOR INSTRUCTIONAL DENTAL LABORATORY FACILITY



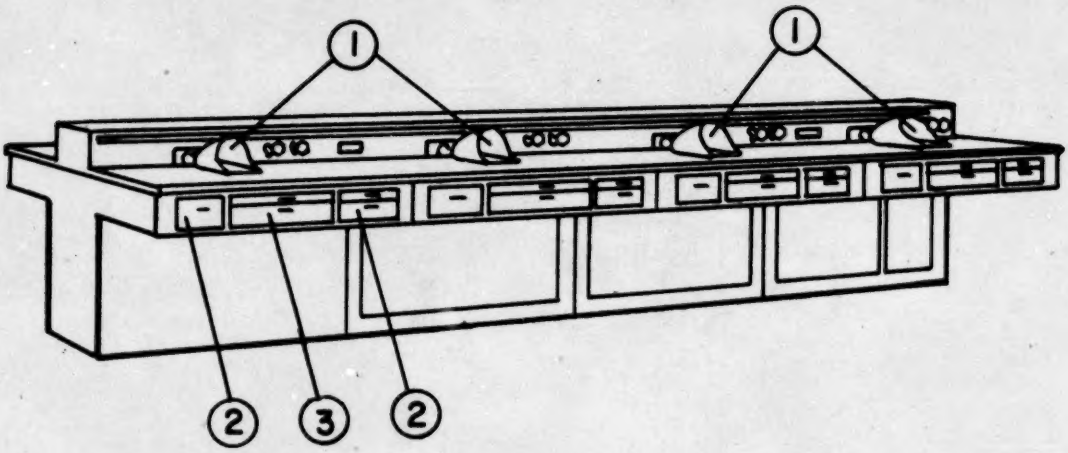
STUDENT WORK STATION AREA IS EXPANDABLE AS FACILITY PERMITS. AMPLE SPACE SEPARATING SIT-DOWN WORK AND STUDY AREA FROM STAND-UP WORK AREA IS NECESSARY TO PERMIT FREEDOM OF MOVEMENT AROUND WORK STATIONS. SUFFICIENT SPACE FOR STUDENTS AROUND DEMONSTRATION BENCH IS ALSO REQUIRED.

INSTRUCTOR'S DEMONSTRATION BENCH



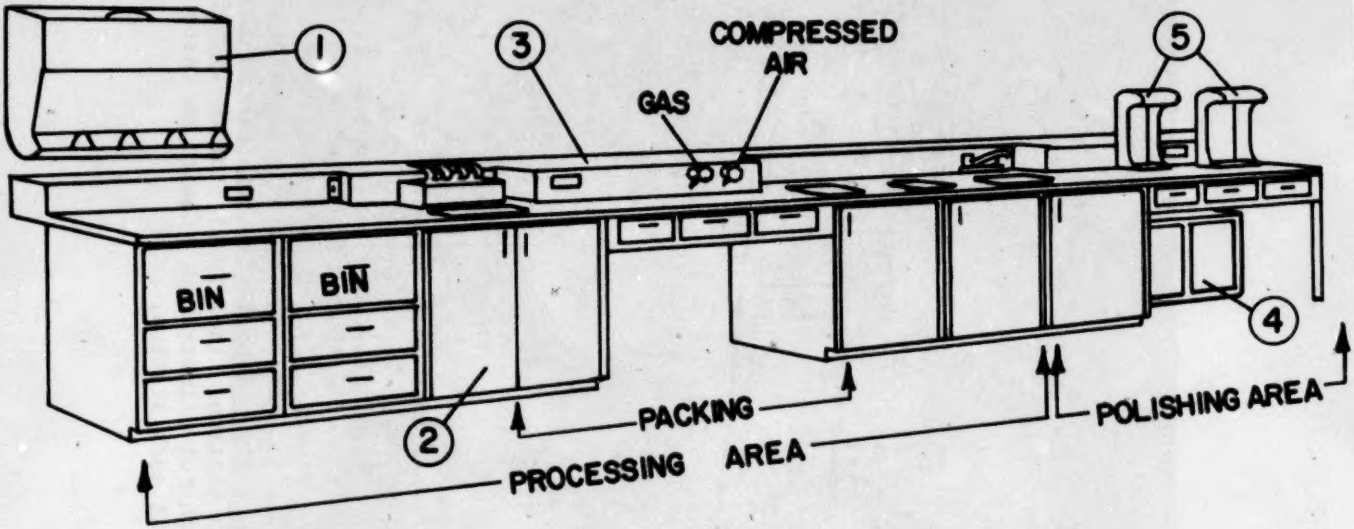
Demonstration bench should be equipped with a stainless steel sink (1) and should have natural gas, compressed air, and electricity supplies. Ample storage drawers (2) for instruments, equipment, and supplies should be included, as well as scrap collection drawers (3). A master shut-off of the laboratory's gas and electricity supplies should be located at this bench. The platform is optional, depending upon the desires of the teacher and the layout of the room.

SIT-DOWN WORK AREA



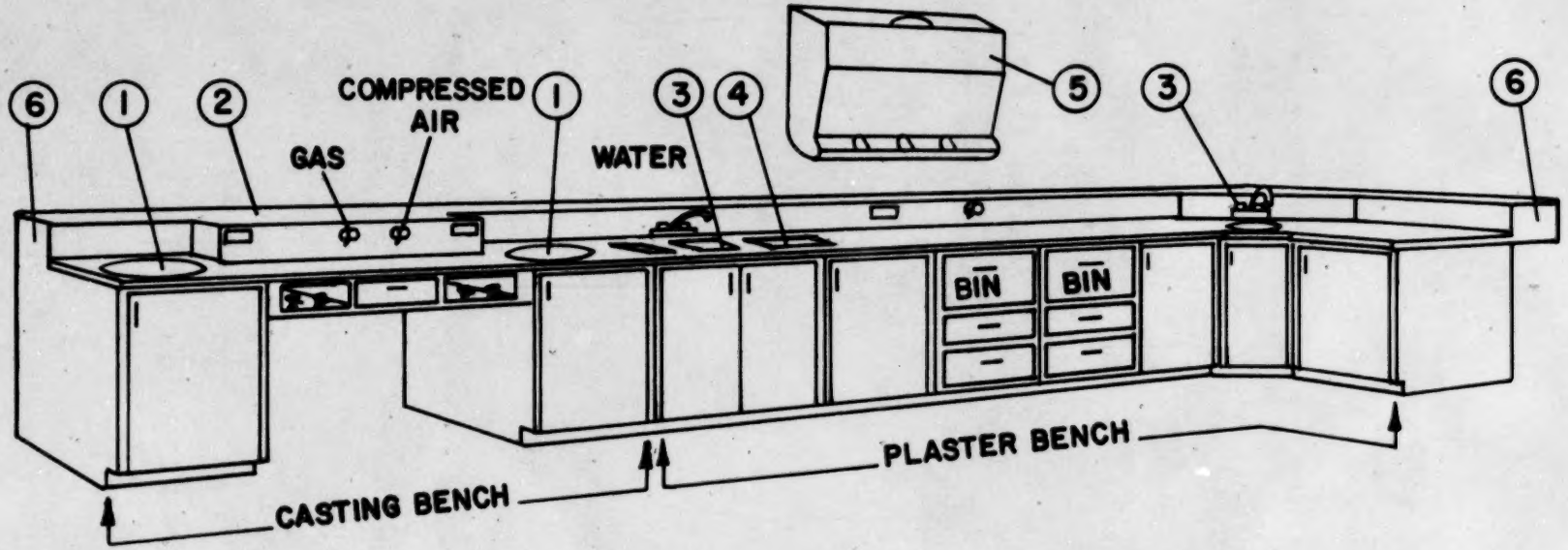
Note individual removable dust collectors (1) which enable each student to operate both bench lathe and bench engine at each station with minimal contamination and maximum safety. This system also increases the efficiency of the lab operation. Each work station also has drawers (2) for individual student's instruments and supplies. Scrap collection drawers (3) are also necessary. Compressed air, electricity, and natural gas should be available at each station. Individual station lighting is recommended, although not illustrated. Chairs on caster wheels should be provided at each station.

STAND-UP WORK BENCH FOR PROCESSING AND POLISHING



Elevated plaster bin (1). Combination boil-out, curing, and flush-out tanks (2). Packing area should have electricity, compressed air, and natural gas supply. Elevated space (3) is desirable for location of presses. Polishing area should accommodate trimming, pumice, and polishing. A dust evacuation unit (4) with splash pans (5) is necessary in the polishing area. Splash pans should have individual lighting.

STAND-UP WORK BENCH FOR CASTING, SOLDERING, AND PLASTER WORK



Casting wells (1) are preferable to any other installation for safety reasons. Note casting bench area with ample elevated space (2) for burn-out ovens. Casting bench should have 110/120-volt electricity supply, natural gas, and compressed air. Plaster bench has stainless steel sinks (3) at both ends for efficiency. Plaster bench has scrap chute (4). Elevated plaster bin (5) is recommended to avoid contamination of materials. Plaster bench should have compressed air and electricity supply. Elevated shelf area (6) on back of bench aids in cleanup and reduces contamination of equipment and supplies.

SUGGESTED INSTRUMENTS AND PORTABLE EQUIPMENT

In addition to the fixed equipment outlined, tools and portable equipment are needed to operate a Dental Laboratory Technology program. Each teacher approaches an instructional situation a little differently and will, therefore, use the equipment in a different fashion. For this reason, no recommendations are made regarding quantities of listed items.

Articulator; crown and bridge

Articulator; Model H-2 with shortposts

Articulator; plane line

Balance; triple beam, with metric weights, class C

Bite rim former

Block; bur

Blowpipe; soldering and casting nozzle

Bunsen burner

Carver; No. 3

Carver, Roach

Carver; wax

Casting machine; heavy duty

Casting machine; thermotrol

Cleaner; ultrasonic, with timer and accessories

Combination vac-u-vestor and power mixer; with 20,000, 50,000, and 1,200 cc drive nuts.

Compressor

Conditioner; hydro colloid

Copper plating machine; with accessories

Curing unit; with thermostat and timer

Dental saw

Eraser; air

Flask; acrylic bridge and inlay

Flask; duplicating

Flask; inlay (rings)

Flask; Pour-n-cure

Flask; upper and lower, ejector

Flask press; 2-flask capacity

Furnace; burn-out, with timer

Furnace; porcelain

Gold gauge, for crowns

Graduate cylinder; double scale, 30-60-125 ml.

Grinder; high-speed

Handpiece; air driven, with regulator and lubricator

Hot plate; regular

Knife; Bard-Parker

Knife; No. 6R and No. 7R

Laboratory engine; with rheostats

Laboratory handpiece

Lathe; polishing, heavy duty ball bearings, highboy

Lathe; polishing, heavy duty ball bearings, lowboy

Lathe accessories, right side; chuck and emery cloth arbor

Lathe accessories, left side; stone chucks and taper wheel chucks

Lathe splasher; with removable tray

Model trimmer

Nippers; diagonal cutting

Nippers; plaster, stainless steel

Pan; porcelain and pickling

Packing press; pneumatic

Pliers; clasp (bending)

Pliers; contouring

Pump; vacuum

Reline jig

Sandblasting unit

Scale; dietetic

Scraper; No. 2 and No. 4

Shears; C & B

Shears; straight

Soldering Block; asbestos

Soldering frame; No. 2 wire

Soldering tweezers; "L" type, stainless steel

Soldering tweezers; "O" type

Soldering torch; gas

Spatula; cement, No. 24, Flexible - blade

Spatula; plaster

Spatula; wax, No. 7 and No. 31

Sprue former; small

Sprue former; universal

Square occlusal plane

Surveyor; complete

Template; posterior, 20 degree

Timer; interval

Tongs; casting ring, large

Tongs; casting ring, small

Torch; alcohol

Trap; plaster sink

Tripod; No. 53

Vacu-press; manual

Vehe carver

Vibrator; large

Vibrator; small

Water bath; hygroscopic, regular *

Wax gauge

Waxing unit; electric

Work box or prescription pan

* Needed only if hygroscopic technique is used.

SUGGESTED INITIAL SUPPLIES

The quantities of supplies needed at the beginning of the instructional program depends upon the number of students in the class.

Alcohol; fuel

Alginate; regular set

Anti-flux

Applicator; cotton tipped

Arbor band; round, 3/4", medium

Asbestos; medium

Baseplate; double-thick, uppers and lowers

Baseplate; single pink, uppers and lowers

Bead; retention

Belt; green line engine, 9 feet 8 inches

Bite Block; wax, recessed, regular

Blade; Bard-Parker knife

Blade; saw

Blasting compound, for air eraser

Brush; brass bristle

Brush; hand scratch, wood handle

Brush; paint, 1/2 inch (for applying separator and petroleum jelly)

Brush; Robinson standard, stiff and soft

Brush; sable, Nos. 00, 3, 4, 5, 6

Brush; scouring

Buff; muslin, 3 inches x 30 ply

Bur; H.P. steel, Nos. 1, 2, 4, 6, 33 1/3, 34, 35, 37

Bur; H.P. steel, Nos. 557, 558, 559, 700, 701

Bur; vulcanite, flame shape, No. 1

Bur; vulcanite, pear shape, No. 3

Bur; vulcanite, round, No. 1

Cartridge; molding compound (for dies), large

Cellophane

Cleaner; general purpose

Clasp wire; round, 18 gauge, stainless steel

Cleaner; tartar, stain, cement plaster-stone, alginate

Cone; felt

Cylinder; graduated, 10 ml, 50 ml, 100 ml

Debubblizer

Diamond; sintered, set of 4

Disc; abrasive paper, No. 525

Disc; foam separator

Disc; separating, doublesided, 7/8 inch

Disc; Vacu-press, Nos. LWCT 20, LWCT 30, LDG 30

Dish; Dappan

DWTS technique gold; gold color

Flexibole; large

Flexibole; medium

Flux; casting

Flux; soldering

Frame; saw blade

Funnel; ploypropylene

Gauze

Glasses; safety

Hemostat; curved nose

High-shine

Hydrocolloid

Impression material; rubber base

Incisor; mandibular, with full crown prep

Incisor; maxillary, with full crown prep

Investment; universal

Jar; resin mixing, opaque, small, medium, large

Jet-bite

Kit; cleaning and polishing, metallic

Kit; crown and bridge stain

Kit; porcelain, basic and supplementary

Kit; porclain finishing

Kit; opaquer

Kit; repair, self-cure

Kit; tooth colored resin, cold-cure, large introductory assortment

Kit; tooth colored resin, heat-cure, large in introductory assortment

Lubricant; die

Lubricant; tubes

Mandrel; steel, No. 303-1/2

Measure set; denture base resin, powder/liquid

Mini-buffs and cones

Mixing slab; glass

Molar, mandibular, with Class II inlay prep

Molar; mandibular, with full crown prep

Molar; maxillary, with Class II inlay prep

Molar; maxillary, with full crown prep

Mold; dentulous, with third molars

Mold; edentulous

Moldguide; anterior and posterior

Paper; articulating, thick and thin

Pattern; plastic, Nos. LR4, LB2, RC6, SCI-3, FRI-2

Petroleum jelly

Pickling solution

Pin; dowel, regular

Platinum foil

Plaster; model

Plasti-phane

Pliers; pin set

Point; blue adhesive, Nos. 52, 53, 112

Point; finishing, for resin and gold, rubber

Pumice; medium and coarse

Quartz

Rapid waxer

Resin; denture base, heat-cure and self-cure

Rouge

Ruler; plastic, millimeter

Scoop; polyethylene, with handle

Shade guide

Silicone spray

Solder; gold, DWTS

Sodium citrate

Spoon; measuring

Stone; yellow dental

Stone; die

Stone; green H.P., assorted

Stone; heatless, assortment

Tank; oxygen

Teeth; anterior, porcelain technique, 1 x 6 vacuum fired

Teeth posterior, rational technique, 1 x 8 vacuum fired

Teeth; posterior, 20 degree technique, 1 x 8 vacuum fired

Teeth; posterior, 33 degree technique, 1 x 8 vacuum fired

Thermometer; pocket, maximum registering, 0° to 220°F.

Thermometer; pocket, maximum registering, — 20° to 100°C.

Tinfoil; regular

Tinfoil; substitute

Tray; die lock, full and quadrant

Tray; resin, set; regular set, plastic, white powder/liquid

Tray; stock, rim lock, perforated

Trimmer; blue abrasive, Nos. 1, 2, 3, 4

Trimming wheel; rubber abrasive acrylic, 3 inches x 3/8 inch or 3 inches x 1/4 inch

Tripoli

Tubing; latex, amber, 3/32 inch and 3/16 inch

Water; distilled

Wax; baseplate

Wax; beading

Wax; half-round blue, 6 gauge

Wax; boxing

Wax; casting, blue inlay, small regular

Wax; casting, ivory inlay, small regular

Wax; casting, sheet, assorted

Wax; sprue, round blue; 10 gauge, 14 gauge, 18 gauge

Wax; sticky, small

Wax, undercut

Wax eliminator

Wheel; chamois, 3 x 30

Wheel; finishing, for resin and gold, rubber

Wheel; model grinding

Wheel; porcelain grinding

Wheel; wire, steel

FOLLOW-UP ACTIVITIES

STUDENT PLACEMENT

Job placement of graduates of Dental Laboratory Technology programs — as for graduates of other programs — is an inherent part of occupational education. While each BOCES or City School District will have an established placement process, there are a few points which should be emphasized.

One of the comments most frequently heard from prospective employers, is that students often fail to obtain jobs because they do not function well in the interview. Although it is not included in the suggested course outline, the teacher should instruct the students in how to apply for a job and how to conduct themselves during the interview. Simulated application, using realistic forms and simulated interviews, can be very helpful in development of these skills. A considerable number of curriculum and instructional resources are available, concerned with obtaining and keeping a job. The New York State Department of Labor makes available in quantity its publications *How to Write a Resume*, *How to Get and Hold the Right Job*, and *Why Young People Fail to Get and Hold Jobs*. An invaluable aid is the Dental Laboratory Technology program's advisory committee, whose members organize and participate in simulated interviews.

There are two key factors in developing a successful job placement process — a quality program of instruction, and personal contact with prospective employers. Development of a close working relationship with the advisory committee, careful selection of the teacher, and planning and maintaining an adequate facility, should result in a quality program which is respected by the dental laboratory industry.

Development of personal contacts with prospective employers is a function of both the teacher and the school's placement coordinator. They should maintain membership in appropriate professional, occupational, and service organizations, and should be available for presentations to these groups regarding the Dental Laboratory Technology program. The placement coordinator, as part of the job development activities, should visit dental laboratories in the area to explain the school's program. Well written letters or carefully prepared publications explaining the Dental Laboratory Technology program, and relating the advantages of having trained technicians, should be sent to dental laboratories, dental clinics, dentists, professional associations, and such allied areas as manufacturers and distributors of dental supplies and equipment. In all these activities too, the advisory committee can be very helpful.

Employability profiles are valuable aids to students seeking employment. They can be brought to interviews and shown to the prospective employer as evidence of the skills they have acquired and the degree to which they have been developed. A sample profile is provided.

BOARD OF COOPERATIVE EDUCATIONAL SERVICES
DIVISION OF OCCUPATIONAL EDUCATION
FIRST SUPERVISORY DISTRICT ERIE COUNTY, N.Y.

EMPLOYABILITY PROFILE

OCCUPATION: Dental Laboratory Technician

SKILLS PROFICIENCY RATING

NAME _____ AREA CENTER _____
Last First

ADDRESS _____ PHONE _____

TOWN, STATE, ZIP _____ AGE _____

EVALUATOR _____ TITLE _____ DATE _____

RATING LEVELS: 1. Instruction Not Received
2. Needs More Instruction
3. Satisfactory
4. Outstanding

COMPLETE DENTURES	1	2	3	4
I. PRELIMINARY CASTS				
Handling materials				
Accuracy				
Identifying landmarks				
Trimming				
II. CUSTOM TRAYS				
Manipulating tray resin				
Manipulating shellac base material				
Design				
Identifying landmarks				
Trimming				
Spacer				
III. MASTER CASTS				
Handling of materials				
Identifying landmarks				
Accuracy				
Trimming				
IV. TRIAL BASEPLATE CONSTRUCTION				
Manipulation of shellac baseplate material				
Design				
Accuracy				
Stabilization				
Trimming				
V. OCCLUSION RIMS				
Manipulation of baseplate wax				
Design				
Manipulation of pre-formed rims				

		1	2	3	4
VI.	ARTICULATION				
	Handling of equipment and materials				
	Accuracy maintaining jaw records				
	Positioning				
VII.	SETTING UP ARTIFICIAL TEETH				
	Upper anteriors - function, contour, esthetics				
	Lower anteriors - function, contour, esthetics				
	Upper posteriors - function				
	Lower posteriors - function				
	Over-all understanding of occlusion				
VIII.	WAXING (FASTOONING)				
	Natural contour				
	Function				
	Esthetics				
	Hygiene				
IX.	INVESTING				
	Separation of casts from articulator				
	Flask preparation				
	Handling of materials				
	Accuracy of matrix				
X.	BOIL-OUT				
	Removal of wax and trial base				
	Preparation of investment for packing				
	Post dam				
XI.	PACKING				
	Preparation of investment				
	Manipulation of denture base resin				
	Characterization				
	Maintenance of tooth position				
XII.	CURING				
	Knowledge of curing requirements				
XIII.	RECOVERY				
	Handling of materials and equipment				
	Detail clean-up				
XIV.	FINISHING				
	Trimming				
	Pumicing				
	Polishing				
	CAST PARTIAL DENTURES				
I.	PRELIMINARY CASTS				
	Handling of materials				
	Accuracy				
	Identifying landmarks				
	Trimming				

		1	2	3	4
II.	ARTICULATION				
	Handling of materials and equipment				
	Accuracy maintaining jaw records				
	Positioning				
III.	BASIC SURVEY AND DESIGN				
	Surveyor				
	Design				
IV.	CUSTOM TRAY				
	Manipulation of tray resin				
	Design				
	Trimming				
	Spacer				
	Perforation				
V.	MASTER CASTS				
	Handling of materials				
	Accuracy				
	Identifying landmarks				
	Trimming				
	Re-survey				
	Design transfer				
	Undesirable undercut block-out				
	Relief				
VI.	REFRACTORY CAST				
	Flask preparation				
	Handling of duplicating material				
	Duplication				
	Handling investment				
	Accuracy				
	Trimming				
	Sprue hole				
VII.	PATTERN CONSTRUCTION				
	Plastic patterns				
	Hand waxing				
	Saddles				
	Clasps				
	Minor connectors				
	Major connectors				

COMMENTS

		1	2	3	4
VIII.	SPRUING - UPPER				
	Auxiliary sprues				
	Cast position on sprue base				
IX.	SPRUING - LOWER				
	Auxiliary sprue				
	Main sprue				
	Pattern preparation				
X.	INVESTING				
	Ring preparation				
	Cast preparation				
	Handling of investment				
XI.	BURNOUT				
	Knowledge of required time and temperatures				
XII.	CASTING				
	Machine perforations				
	Flame control (for gold casting)				
	Metal control				
XIII.	FINISHING				
	Sprue removal				
	High speed grinder				
	Pickling				
	Polishing technique				
XIV.	INVESTING				
	Handling of materials				
	Frame-up				
	Frame-down				
XV.	PACKING				
	Manipulation of denture base resin				
	Maintaining frame position				

COMMENTS

POSTSECONDARY OPPORTUNITIES

The Dental Laboratory Technology program as outlined in this guide, can adequately prepare the graduate for entry-level employment as a technician, whether offered at the secondary level or postsecondary. Although subsequent on-the-job training and experience will be necessary, no additional school program is necessary for employment. For the graduate who desires additional training in a dental technology specialty, or business education preparatory to owning and operating a dental laboratory, there are a number of two-year colleges offering pertinent programs. The *Directory of Postsecondary Schools with Occupational Programs* lists over seventy colleges which offer dental laboratory technology. Some of these schools have been accredited by the American Dental Association, others by the National Association of Trade and Technical Schools.

Experience has shown that the secondary level Dental Laboratory Technology program is excellent background for the prospective dentist. Many students have entered the program as a "leg up" on their ultimate objective, the profession of dentistry; others have developed this goal after enrollment in the Dental Laboratory Technology program. Provided that they have been able to schedule the necessary academic subjects, such students are readily accepted by colleges offering baccalaureate degrees in pre-dental programs.

CERTIFICATION OF THE DENTAL TECHNICIAN

As stated previously, the status of Certified Dental Technician is accomplished through a combination of experience and examination. Graduation from an accredited school is not a requirement for eligibility

to take the certification examination. However, time spent as a student in an *accredited* program *is* accepted as part of the five years of work experience required for eligibility to take the certification examination. As of the publication date of this guide, secondary programs are not being accredited; neither is personal certification as a technician required for employment.

Students who continue their training in an accredited postsecondary program are eligible, on graduation, to take the basic written portion of the Certified Dental Technician examination. Upon satisfactory performance, the applicants are designated "Recognized Candidate" for a period not to exceed four years. After completion of the experience requirement, the candidates may take the written and practical examinations in the specialties of their choice. Graduates of secondary programs, which are not accreditable, must wait the full five years before beginning the accreditation process. Thus, students who desire the status of Certified Dental Technician must weigh the five years wait after graduation from a secondary program against the time and cost of additional postsecondary study.